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## COMPLETE SPECIFICATION

### Improvements in relief valves

We, ELECTROL INCORPORATED, a corporation organised under the laws of the State of Delaware, United States of America, of 85 Grand Street, Kingston, New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to relief valves and is primarily designed to provide a new or improved and simplified relief valve for venting air or other gas from a hydraulic system and for other similar purposes.

According to the invention, the relief valve comprises a body member having a passage therethrough and a raised rim or collar surrounding one end of the said passage, the said rim or collar serving as a valve seating for cooperation with an imperforate portion of a resilient diaphragm to prevent flow of fluid through the passage in one direction and allow flow of fluid in the opposite direction, the diaphragm having a stiffened peripheral edge portion and including one or more openings disposed outwardly from the said imperforate portion to permit flow of fluid past the diaphragm, and supporting means for the diaphragm adjustable to move the outer portion of the diaphragm relatively to the rim or collar to vary the pressure of the diaphragm against the rim or collar and the resistance of the diaphragm to displacement of the imperforate portion away from the rim or collar by fluid under pressure in the said passage.

In order that the invention may be clearly understood and readily carried into effect, a relief valve constructed in accordance with the invention will now be more fully described, by way of example only, with reference to the accompanying drawing

which is a longitudinal section through the relief valve.

In the particular embodiment illustrated in the drawing, the valve includes a generally cylindrical body portion 10 which is provided with a coupling 11 having external screw-threads 12 to enable it to be screwed into a vent in a tank or into the end of a pipe or the like. The body portion 10 is provided with a flange 13 of hexagonal or other suitable shape for reception of a wrench or other tool for screwing the valve into the vent, pipe or the like.

The body 10 has a passage 14 extending axially thereof, and, at the right-hand end of the passage, an annular rim or collar 15 which forms an annular valve seating.

The valve body 10 also has a screw-threaded portion 16 for receiving a complementally threaded cap 17 which serves to support a flexible diaphragm member 18 for cooperation with the seating 15.

The cap 17 has a disc-like bottom or end 19 which is provided with a series of apertures 20 to permit flow of gas therethrough. It also has flats or flat surfaces 21, 21 thereon for engagement by a wrench or other tool to enable the cap to be screwed onto or off the threaded portion 16 of the body 10.

The diaphragm 18 in the cap 17 has an imperforate centre portion 23 of greater area than the area of the collar or valve seating 15 and is adapted to overlie and normally to bear against the valve seating 15. Between the centre portion 23 and the outer edge of the diaphragm are a series of openings 24 to enable gas to pass by the diaphragm when the pressure in the passage 14 is sufficient to displace the imperforate centre 23 of the diaphragm from the seating 15. In order to retain the diaphragm in position and prevent it from collapsing when subjected to pressure, the diaphragm is provided with a thickened rim portion 25 in which is embedded a ring 26 of spring metal, such as spring steel, or the like. The ring

26 prevents the rim of the diaphragm from collapsing and holds the diaphragm firmly in engagement with the right angularly related shoulders 27 and 28 formed within the cap member 17. Inasmuch as the diaphragm will not collapse when subjected to pressure at its centre, the pressure of the diaphragm against the valve seating 15 can be varied to enable the valve to have greater or lesser resistance to opening in response to pressure in the passage 14. Thus, the cap 17 may be screwed onto the valve body 10 a distance such that the diaphragm 18 makes only light contact with the valve seating 15. In this adjusted position, the diaphragm may be displaced by fluid pressure of relatively small magnitude in the passage 14. The cap 17 can be screwed farther onto the valve body to stretch the diaphragm 18 and engage the valve seating 15 with substantially greater pressure thereby requiring greater fluid pressure in the passage 14 to unseat the diaphragm and allow escape of fluid past the diaphragm. The diaphragm 18 will, of course, prevent the flow of air or other gas in a reverse direction. It serves, therefore, as a sensitive and readily adjustable check valve for relieving pressure in a fluid system.

The diaphragm is formed of resilient non-metallic material such as natural rubber, synthetic rubber, synthetic elastomers and the like, so that it is not susceptible to corrosion and thus has a long operating life.

Inasmuch as relative movement between the movable elements of the valve is solely accomplished by flexing of the diaphragm 18, there is no possibility of jamming of the valve either through friction or misalignment of parts. Thermal expansion and contraction will have no effect on the operation of the valve other than possibly a minor change in the pressure required to displace the diaphragm 18 from the seat 15.

The use of a resilient diaphragm does away with the need for a spring to close the valve. The resiliency of the diaphragm produces the necessary seating pressure for the valve. It will be apparent that valves of the type described above are simple in construction and easily and quickly manufactured with a minimum number of precision operations. Even the valve seating 15 does not have to be a precision part because the resiliency of the diaphragm will accommodate slight roughnesses or inaccuracies on the face of the valve seating.

It will be understood that the valve is susceptible to considerable modification in its size and proportions and that the

materials from which the valve is made and its over-all appearances can be modified as required.

What we claim is:—

1. A relief valve comprising a body member having a passage therethrough and a raised rim or collar surrounding one end of the said passage, the said rim or collar serving as a valve seating for cooperation with an imperforate portion of a resilient diaphragm to prevent flow of fluid through the passage in one direction and allow flow of fluid in the opposite direction, the diaphragm having a stiffened peripheral edge portion and including one or more openings disposed outwardly from the said imperforate portion to permit flow of fluid past the diaphragm and supporting means for the diaphragm adjustable to move the outer portion of the diaphragm relatively to the rim or collar to vary the pressure of the diaphragm against the rim or collar and the resistance of the diaphragm to displacement of the imperforate portion away from the rim or collar by fluid under pressure in the said passage.
2. A relief valve according to claim 1, in which the diaphragm has a thickened peripheral edge in which a reinforcing ring is embedded.
3. A relief valve according to claim 1 or claim 2, in which the diaphragm is supported by a cap member mounted on the body member, the cap member being adjustable on the body member to vary the pressure of the diaphragm against the rim or collar.
4. A relief valve according to claim 3, in which the resilient diaphragm is supported by a cap member mounted on the body member, the cap member having a perforated end, and the diaphragm being spaced from the said perforated end of the cap member.
5. A relief valve according to any one of the preceding claims, in which the diaphragm is supported by means engaging with its peripheral edge portion and supporting the diaphragm so that its central portion engages with the rim or collar.
6. A relief valve according to claim 1, 110 having its parts constructed and arranged substantially as described with reference to the accompanying drawings.

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**751,289**  
**1 SHEET**

## COMPLETE SPECIFICATION

*This drawing is a reproduction of  
the Original on a reduced scale.*

